

Thinking About Knowledge and How to Get It

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One of the most important decisions we make in our careers concerns the criteria we rely on to evaluate knowledge claims. The criteria we use influence selection of questions (theories) to explore (e.g., those that can be falsified), research methods to use (e.g., those that rigorously test guesses) and speaking and writing styles (e.g., clear). We could, for example, choose scientific criteria or rely on authority or popularity as a guide. Misinformed discussions of "different ways of knowing" abound in the social work literature (and in psychology as well) and many graduates of doctoral programs to whom I have spoken, including those from Berkeley, are quite ignorant about the philosophy of science. They confuse science with logical positivism, scientism, and pseudoscience, and, in so doing, misinform rather than inform those whom they teach. They embrace a justification approach to knowledge that encourages inflated claims of what is known and gets in the way of discarding unpromising directions.

Another reason for selecting this topic concerns related ethical issues. Our concern for helping and not harming clients obliges us to critically examine the criteria we use to evaluate knowledge claims. Theories (e.g., about "what works") are conjectures about what may be true. We always have theories. "There is no pure, disinterested, theory-free observation" (Popper, 1994, p. 8). Because our theories influence our decisions, they are important to examine. Karl Popper (1994) defines truth as the correspondence of statements with facts. If a professor says assertive community outreach has been shown to be helpful, he should base this statement on critical tests of this claim, including evidence regarding the acceptability of the program to all involved participants (Baer, 1988; Schwartz & Baer, 1989). If we rely on questionable criteria for evaluating knowledge claims, clients may be harmed rather than helped, false hope may be created, harmful side effects experienced, and effective methods foregone (see, for example, O'Donohue & Szymanski, 1994; Skrabanek & McCormick, 1992). The history of the helping profession clearly shows that good intentions will not protect clients from harm. Consider the history of institutionalized psychiatry (Szasz, 1994; Valenstein, 1986). Consider also harms done by overzealous advocates of repressed memories (Ofshe & Watters, 1994). Consider the results of accepting claims of effectiveness regarding facilitated communication based on qualitative data (e.g., anecdotal case reports) that were

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later shown to be false based on controlled research findings (Jacobson, Mulick, Schwartz, 1995). The findings of experimental, in contrast to qualitative, studies of the effects of facilitated communication (a method alleged to help nonverbal people talk) "have been consistently negative indicating that FC is neither reliably replicable nor valid when produced" (p. 754). These controlled studies showed that the communication alleged to be from previously nonverbal people was actually determined by the facilitators. Margolin (1997) argues that social workers mystify their clients and are themselves mystified about their main roles and aims (judging, evaluating, and classifying clients rather than helping them).

It is astonishing that all doctoral students (and those at other educational levels as well) are not required to take a course in the philosophy of science given its relevance both to research and practice. This would highlight the clash between science and authoritarianism as competing criteria on which to base knowledge claims. It would help students to distinguish between science and pseudoscience and quackery and to spot and counter propaganda. We are all philosophers in that we make scores of decisions every day. Social workers make decisions that affect other people's lives, making it incumbent on them to make well reasoned decisions and help their clients do so as well.

All men and all women are philosophers. If they are not conscious of having philosophical problems, they have, at any rate, philosophical prejudices. Most of these are theories which they take for granted: they have absorbed them from their intellectual environment or from tradition. Since few of these theories are consciously held, they are prejudices in the sense that they are held without critical examination, even though they may be of great importance for the practical actions of people, and for their whole life. (Popper, 1992, p. 179).

The question, "What is knowledge?" has been of concern to philosophers throughout the ages. Raymond Nickerson (1986) defines knowledge as information that decreases uncertainty about how to attain a certain outcome. This definition seems especially pertinent to the professions. Given this definition, we can ask how can knowledge be gained? What knowledge will help us to solve problems clients confront (e.g., elder abuse, a need for reliable respite care)? How can we avoid fooling ourselves that we have it when we don't? What values, knowledge, and skills will maximize the likelihood of knowledge development and diffusion and what educational formats are most likely to contribute to this? We can examine the degree to which educational programs provide learning and teaching conditions that maximize the outcomes that are sought and promised. We can examine the extent to which they provide relevant content and performance knowledge that contribute to helping clients and avoiding harm, and also the extent to which they decrease irrelevant and false knowledge.

Different ways of knowing differ in the extent to which they highlight uncertainty and are designed to weed out biases and distortions that may influence assumptions. Certain "ways of knowing" compared to others are designed to rigorously test guesses (e.g., about effectiveness). The very purpose of experimental studies and certain kinds of single-case

designs is to avoid unwarranted assumptions about effects. (Whether they offer information about the role of methods used in the reported effects depends on the particular design used.) Karl Popper suggests that we do not know more today than we did thousands of years ago because solving some problems creates new ones. For example, medical advances have created new problems such as over population.

There is no agreement on "one way of knowing" in social work and it is certainly not scientific reasoning that is accepted, as can be seen by examining the literature in social work on "different ways of knowing." Quite the opposite. In reviews of research published in five social work journals, Glisson (1990) found that the majority of studies (63 percent) used surveys without probability sampling. Only a small percentage involved single case (1.9 percent) or experimental studies (4.6 percent). Fraser and his colleagues (1994) reported similar findings in a review of 10 journals between 1985 and 1988. Fewer than half of all articles reviewed were research based, and fewer than six percent of these used an experimental design. Most studies relied on percentages and simple counts. Fewer than half of the surveys used multivariate statistical methods. Fraser and his colleagues (1994) concluded that "the core social work literature contains little rigorous research from either a quantitative or qualitative point-of-view" (p. 253). Antiscience is common (perhaps most common) in academic settings (Patai & Koertge, 1994). Many people confuse science, scienticism, and pseudoscience, resulting in an antiscience stance. Some argue that nothing can be known "for sure." (This is assumed in science.) Relativists argue that all methods are equally valid in testing claims (e.g., anecdotal reports and experimental studies). Typically, such views are offered unrelated to a specific real-life problem and a critical appraisal of the results of competing views in minimizing the problem. That is, discussions are not problem focused. Some argue that because we know nothing for sure, we really know nothing. We should follow out the logic of each position. Can you walk through walls or jump from high windows without harm? If we know nothing, then what is the rationale for professional education? The clear success of scientific methods in hundreds of areas shows that all methods are not equally effective in testing knowledge claims.

Munz (1985) argues that "there are many pieces of knowledge held consciously which have very little direct bearing on physical survival." (p. 74). He defines false knowledge as beliefs that are not true and that are not questioned. Such beliefs "can be held or discarded regardless of the environment in which people who hold them are living. Nevertheless, they are frequently used for a very useful function. They are used as a social bond so that societies can be formed with defined members and these societies can survive because the defined membership makes cooperation and division of labor possible" (p. 74). In this kind of society, membership depends on being able to give correct answers to a catechism; beliefs "are not available for criticism and therefore cannot be examined. They are held dogmatically. Such dogmatism should, however, not blind us to that the fact that it performs a very useful and essential function in keeping the society together." (p. 74). "In catechismic societies, people practice cognitive mercantilism and thus exempt knowledge from the pressures of a free market" (p. 75). In these kind of societies "certain axioms, values, sentiments and beliefs remain impervious to experience and indifferent to contradiction." (p. 75). "It follows, therefore, that only in societies where the social order is non-catechismic (i.e., cognitively neutral) can beliefs and theories be examined critically" (p. 75). The growth of knowledge

depends on the possibility of trial and error which "depends on the presence of alternative theories which, if the old ones do not pass the trial, can be substituted and, in turn, subjected to further trial and error." (p. 76).

Questionable Criteria

Questionable criteria on which to base knowledge claims include authority, popularity, testimonials, newness, tradition, experience and intuition (see Figure 1). These criteria do not provide critical tests of claims, often because they consider only part of the picture (e.g., only examples that support a belief). Consider authority. An example is citing a famous person to support a claim. The source of this fallacy is the mistaken assumption that status is correlated with accuracy. History shows that authority is not a sound guide about what is accurate. Nor do popularity or consensus provide sound guides (basing beliefs or actions on what most people accept). A researcher may adopt qualitative methods to test claims about service effectiveness because many other researchers use these methods. Reliance on popularity is similar to relying on consensus (what most people believe). But what most people believe may not be correct. Thousands of dollars have been spent at Berkeley to identify social work competencies based on consensus, a notoriously poor guide to what is true and what is false.

Nor do tradition (what's been done in the past) or newness (the latest method) provide sound guides. Simply because something is new or innovative does not mean it is effective. After all, everything was new at some time. Other questionable criteria on which to base claims include manner of presentation (e. g., the confidence with which a claim is presented) and appeals to good intentions. Good intentions and helping clients do not necessarily go together as the history of the professions shows. Nor does what "makes sense" provide a sound guide. The history of science shows that great ideas often fly in the face of "common sense." In the case example fallacy, conclusions about many clients are made based on a few unrepresentative examples. This involves faulty generalization; what may be true in a few cases may not be at all true of many other cases. Cases that "prove the point" can always be found. Reliance on testimonials (reports on the part of people who have used a product or service that the product or service is effective) is a variant of the case example fallacy and is subject to the limitations of case examples in offering evidence for a claim. The problem with testimonials is not that the report about an individual's personal experience with a given method is not accurate, but the further step of making a claim that this experience means that the method works.

The key problem in relying on experience as a guide to what is accurate is the lack of comparison (Dawes, 1988). Our experience is often restricted and biased. A child welfare worker may assume that few child abusers stop abusing their children because she sees those who do not stop abusing their children (Dawes, 1989). Her experiences with this biased sample results in incorrect inferences about the reoccurrence of child abuse (i.e., an overestimate). We tend to recall our successes and forget our failures. Unless we have kept track of both our hits and our misses we may arrive at quite inaccurate beliefs. A further problem in relying on experience concerns the biased nature of our memory for what happened. Chalmers (1983) notes that "the ability of medical students to assess the quality of

evidence used to support authoritative claims actually deteriorates as they come into increasing contact with clinical teachers" (Obstetrical Practices in the United States, 1978, p. 30). Is this true in social work? Has anyone cared enough to find out?

Intuition is another criterion used to evaluate the accuracy of claims. Jonathan Baron (1994) defines intuition as "an unanalyzed and unjustified belief" (p. 26) and argues that beliefs based on intuition may be sound or unsound and suggests that because of this, basing beliefs on intuition may result in consequences that harm people. Although both intuition and experience provide valuable sources for ideas about what may be true, they do not provide a sound guide about their accuracy. Over 100 studies show that predictions based on relevant statistical data that integrate information from a variety of sources are more accurate than predictions based on intuition. Predictions based on intuition are likely to be inconsistent (Dawes, Faust, & Meehl, 1989).

What about Postmodernism?

Some social workers have become enamored with postmodernism, a current form of relativism. It is assumed that knowledge and morality are inherently bounded by or rooted in culture (Gellner, 1992, p. 68). "Knowledge or morality outside of culture is, it claims, a chimera.... Meanings are incommensurate, meanings are culturally constructed, and so all cultures are equal..." (p. 73). In his brilliant book Postmodernism, reason and religion, Ernest Gellner argues that this view is an affectation: "Those who propound it, or defend it against its critics, continue, whenever facing any serious issue in which their real interests are engaged, to act on the non-relativistic assumption that one particular vision is cognitively much more effective than others" (p. 70). Consider for example the different criteria social workers want their physicians to rely on when confronted with a serious medical problem compared to criteria they say they rely on to select service methods offered to clients. They rely on intuition, testimonials, and case examples when making decisions about their clients but want their physicians to rely on the results of controlled experimental studies and demonstrated track record of success based on data collected systematically and regularly when making decisions about a serious medical problem of their own (Gambrill, 1996). Shouldn't what's good for the goose be good for the gander? Is there hypocrisy here?

Gellner argues that the sole focus on cognitive meaning ignores political and economic influences. He argues that postmodernism "denies or obscures tremendous differences in cognition and technical power, differences which are crucial for the understanding of current developments of human society" (pp. 71-72). He points out that there are real constraints in society which are obscured within this recent form of relativism and suggests that such cognitive nihilism constitutes a "travesty of the real role of serious knowledge in our lives" (p. 95). Gellner argues that this view undervalues coercive and economic constraints in society and overvalues conceptual ones; "hermeneutists do not seem to be very interested in political and economic structures: it is domination by symbols and discourse which really secures and retains their attention" (p. 63). As he notes, concepts do constrain. "What is not obvious is

Figure 1:

Questionable Criteria for Evaluating Knowledge Claims

<u>Criteria</u>	<u>Example</u>
o Authority (what do the "experts" say?)	"If Freud said it, it must be true."
o Popularity (argument ad populum)	"Eighty percent of social workers use It has to be sound."
o Manner of presentation	"She was very convincing. Her results must be true."
o Experience	"I have worked with clients like this for ten years."
o Tradition	"That's what our social service agencies provide to clients."
o What's new	"It's the latest method. We should use it too."
o Uncritical documentation	Accepting claims based on vague undocumented evidence.
o Case examples	"I use narrative therapy with my clients and they improve dramatically."
o Testimonials	"It works. I tried it!"
o Characteristics of the person (ad hominem)	"She graduated from Ohio State University."
o Good intentions	"We care about our clients." (Said in response to a question about service effectiveness.)
o What makes sense	The reasoning behind bioenergetics makes sense."
o Intuition	"I trust my feelings when deciding what helps clients."
o Entertainment value	"I really enjoy using this research method."

just how important a part conceptual constraint plays, when compared with political or economic pressures" (p. 63). Gellner argues that the relative role of meanings and external facts (economic and political contingencies) is obscured. "If we live in a world of meanings, and meanings exhaust the world, where is there any room for coercion through the whip, gun, or hunger?" (p. 63). He argues that the claim that there are no objective facts is simply false. "You cannot investigate idiosyncratic meanings without placing them in the context of nature as seen by our scientific culture, and, in particular, in the context of the shocking inequalities of power of diverse cognitive styles" (p. 69). It is ironic that a view giving so little attention to economic and political power is so warmly embraced in a profession allegedly devoted to decreasing inequalities in living conditions. Some would argue that conceptual views follow (rather than precede) political and economic contingencies. (For other critiques of postmodernism see, for example, Munz, 1987; 1992.)

There are many payoffs for embracing relativism. It frees one from evaluation both by self and others. It frees one to be obscure. It frees one to pursue political and economic power while denying this pursuit.

Misunderstandings and Misrepresentations of Science

Surveys show that most people do not understand the basic characteristics of science (Miller, 1987). Misconceptions about science include the following:

- o There is a search for final answers.
- o Intuitive thinking has no role.
- o It is assumed that science knows or will soon know all the answers.
- o Objectivity is assumed.
- o Chance occurrences are not considered.
- o Scientific knowledge is equivalent to scientific thinking.
- o The accumulation of facts is the primary goal.
- o Linear thinking is required.
- o Passion and caring have no role.
- o There is one kind of scientific method.
- o Unobservable events are not considered.

Discussions of science in social work journals often misrepresent what science is and what it is not, confusing it with naive empiricism, logical positivism, essentialism, and pseudoscience. As Phillips (1987) remarks, many who write about the philosophy of science have not done their homework (see also Phillips, 1992). Some writers equate rigor with rigor mortis. It is assumed that careful exploration of claims and beliefs requires a distortion of events studied and produces data of little value. Rigor does not have to result in rigor mortis (i.e., data of little value in decreasing uncertainty about questions posed), as well shown by the problems addressed by scientific methods. Systematic inquiry and the discovery of practice knowledge does not require the use of complex statistics (see for example, Journal of Applied Behavior Analysis).

Misunderstandings about science may result in ignoring this problem-solving method and the knowledge it has generated to help clients to enhance the quality of their lives. Misunderstandings and misrepresentations of science are so common that D. C. Phillips, a philosopher of science, titled his latest book The social scientist's bestiary: A guide to fabled threats to and defenses of naturalistic social science (1992). Academics often confuse logical positivism (discarded by scientists long ago) and science as we know it today and do not distinguish between justification and fallibilistic evolutionary approaches to knowledge (critical rationalism). Science is often misrepresented as a collection of facts or as referring only to controlled experimental studies. Some protest that science is misused. Anything can be misused, including social work services. Some believe that critical reflection is incompatible with passionate caring. Reading the written material of any number of scientists including Albert Einstein, Loren Eiseley, Karl Popper, and Carl Sagan would quickly put this false belief to rest.

Far from reinforcing myths about reality as some suggest (e.g., Karger, 1983, p. 204), science is likely to question them. This is one reason fear of science is as old as science itself (White, 1896). Science emphasizes uncertainty. Authoritarianism specializes in pronouncements of what is true and what is false. The history of science and medicine shows that the results of experimental research involving systematic investigation often free us from false beliefs that harm rather than help and decrease our susceptibility to fraudulent claims. Science is conservative in insisting that a new theory account for previous findings. (For critiques of the view that advances require the abandonment of prior knowledge, see Phillips, 1987.) It is revolutionary in calling for the overthrow of previous theories shown to be false. That does not mean that the new theory has been established as true. Many scientific discoveries, such as Darwin's theory of evolution, clash with religious views of the world. Consider also the Church's reactions to the discovery that the earth was not the center of the universe; only after 350 years did the Catholic Church agree that Galileo was correct in believing that the earth revolves around the sun. All sorts of questions that people may not want raised may be raised, such as: Does this residential center really help residents? Would another method be more effective? Are my methods really helpful to clients? How accurate is my belief about _____? Does this research method critically test this claim? Am I making inflated claims of knowledge based on this research?

Instructors and students who are misinformed about what science is and what it is not in turn miseducate others, including clients, and will not be able to fulfill their professional obligation to fully inform clients (e.g., about what service methods have been critically tested to what effect). Miseducated students will not be able to distinguish science from pseudoscience and so will not be able to help their clients to do so. No wonder so many social workers fall for human service advertisements and uncritically embrace the latest fad. Misinforming students occurs even in research courses. For example, a graduate of our own doctoral program who teaches research to masters students recently dismissed science as a way to discover and try to solve problems because "it was linear." This is incorrect, but, even if it were correct, if a linear approach yields solutions to clients' concerns, who cares? An accurate understanding of science will help you to distinguish between helpful, trivializing, and bogus uses. Bogus uses may create and maintain views of problems and proposed solutions that leave

unchanged or decrease the quality of life for clients. Clients may be said to be empowered when in fact their options have narrowed.

What is Science?

Science is a way of thinking about and investigating the accuracy of assumptions about the world. It is a process for solving problems in which we learn from our mistakes. Science rejects reliance on authority (e.g., pronouncements by high placed officials or professors) as a route to knowledge. Science and authority are clashing approaches to knowledge claims (White, 1993). There are many ways to do science and many philosophies of science. The terms "science" and "scientific" are sometimes used to refer to any systematic effort to acquire information about a subject, including case studies, correlational studies, and naturalistic studies. Each of these methods is subject to certain kinds of error which must be considered in evaluating data they generate. Non-experimental approaches to understanding include natural observation as in ethology (the study of animal behavior in real-life settings) as well as correlational methods that use statistical analysis to investigate the degree to which events are associated. These methods are of value in suggesting promising experiments as well as when events of interest cannot be experimentally altered or if doing so would destroy what is under investigation. Scientific methods are explicitly designed to try to rule out biases. It is well accepted in science that some things cannot be studied without altering them.

The view of science presented here, critical rationalism, is one in which the theory-laden nature of observation is assumed (our assumptions influence what we observe) and rational criticism is viewed as the essence of science (Miller, 1994; Popper, 1972; Phillips, 1987, 1992). Popper's view of science is summed up in four steps: 1) we select a problem; 2) we try to solve it by proposing a theory as a guess about what may be true; 3) we critically discuss and test our theory; and 4) which always reveals new problems. Creative bold guesses about what may be true are essential to the development of knowledge, especially those that are refutable--you can find out if they are false. This view of science emphasizes error-elimination through criticism: "knowledge grows by the elimination of some of our errors, and in this way we learn to understand our problems, and our theories, and the need for new solutions" (Popper, 1994, p. 159). Concepts are assumed to have meaning and value even though they are unobservable. The growth of knowledge can be viewed in its evolutionary perspective as problem solving (Munz, 1985; Popper, 1972; Radnitsky & Bartley, 1987). By testing our guesses we eliminate false theories and learn a bit more about our problems. Corrective feedback from the physical world allows us to test our guesses about what is true or false. We learn which of our guesses are false. Evolutionary epistemologists highlight the two different histories of science: the creation of theories (e.g., through random variation) and their selection (by testing) (Munz, 1985).

Scientific Statements Are Refutable/Testable

The scientific tradition is a tradition of criticism (Popper, 1994, p. 42). The essence of science is creative, bold guessing and rigorous testing in a way that offers accurate information

about whether a guess (conjecture or theory) is correct (Asimov, 1989). Scientific statements are those that are testable (they can be refuted). Consider the question "how many teeth are in a horse's mouth?" You could speculate about this, or you could open a horse's mouth and look inside. If an agency for the homeless claims that it succeeds in finding homes for applicants within ten days, you could accept this claim at face value or gather data systematically to see if this claim is true. Science deals with specific problems that are solvable (that have potential to be answered given available methods of empirical inquiry). Examples are: "Is intensive in-home care for parents of abused children more effective than the usual social work services?" "Is use of medication to decrease depression in elderly people more (or less) effective than cognitive-behavioral methods?" Examples of unsolvable questions include: "Should punishment ever be used in raising children?" and "Are people inherently good or evil?" Saying that science deals with problems that are solvable does not mean that other kinds of questions are unimportant or that a problem will remain unsolvable. New methods may be developed that allow pursuit of questions previously unapproachable in a systematic way. Popper argues that "the growth of knowledge, and especially of scientific knowledge, consists of learning from our mistakes" (p. 93). It is assumed that we can discover approximations to the truth by rational argument and critical testing of theories and that the soundness of an assertion is related to the uniqueness and rigor of related critical tests.

A theory should describe what cannot occur as well as what will occur. Theories can only be falsified if specific predictions are made not only about what can happen, but what cannot happen. If you can make contradictory predictions based on a theory, it is not testable. If you cannot discover a way to test a theory, it is not falsifiable. Testing may involve examining the past as in Darwin's theory of evolution. Some theories are not testable (falsifiable). There is no way to test them to find out if they are correct. For instance, psychoanalytic theory is often criticized on the grounds that it is not falsifiable--that contradictory hypotheses can be drawn from the theory. Irrefutability is not a virtue of a theory but a vice.

Justification vs. Falsification. In a justificationist approach to knowledge development there is a focus on gathering support for (justifying, validating, confirming) claims and theories. Karl Popper argues that we cannot discover what is true by induction (generalizing from the particular to the general) because we may later discover exceptions. Let's say that you see 3,000 swans and they are all white. Does this mean that all swans are white? Can we generalize from the particular (seeing 3,000 swans all of which are white) to the general "All swans are white." In fact, black swans are found in New Zealand. Popper argues that falsification (attempts to falsify, to discover the errors in our beliefs) via critical discussion and testing is the only sound way to develop knowledge (Popper, 1992; 1994). Confirmations of a theory can readily be found if one looks for them. Popper uses the criteria of falsifiability to demark what is or could be scientific knowledge from what is not or could not be. For example there is no way to refute the claim "There is a God." There is a way to refute the claim "Assertive community outreach services for the severely mentally ill reduces substance abuse." We could, for example, randomly distribute clients to two different groups, one of which provides such services, and compare outcomes.

Theories (guesses about what may be true) differ in the extent to which they have been tested and in the rigor of the tests used. Although selection of a theory can be justified by it having survived more risky tests concerning a wider variety of hypotheses (not been falsified) compared to other theories that have not been tested or that have been falsified, it can never accurately be claimed to be "the truth." We can only eliminate false beliefs. "For trial-and-error testing one needs the presence of alternative theories" (Munz, 1985, p. 75). In social systems that focus on social bonding, alternatives can't be entertained and so knowledge cannot grow. "In this way, the progression of scientific knowledge is accidentally related to social systems" (p. 75). Munz (1985) argues that the conditions in which knowledge can grow are historically quite rare. Societies in which knowledge can grow are held together by a "shared practice of criticism, not by a particular belief; not even by the belief that one ought to practice criticism. The practice of radical criticism is not based on the belief that radical criticism is 'right.' If it were, one would call such practice a commitment to a belief which, in turn, cannot be criticized. There is, however, no such commitment. Radical criticism is the simple operation of reason. While reason is not a substantive force which can tell us what is the right thing to do, it is self-sustaining or supporting; for it would simply be against reason to accept any knowledge without criticizing it" (pp. 84-85) (see also Bartley, 1984). Munz argues that the error of the sociologists of knowledge was to insist that there is a particular correct method for the pursuit of knowledge. He argues that "knowledge is not acquired by the pursuit of a 'correct method'; rather it is what is left standing when criticism has been exhausted" (p. 72). He points out that sociologists of knowledge refuse to accept this answer and "have continued to think that if there is knowledge, it must be the result of a 'correct' method of getting it" (p. 72). Munz suggests that sociology makes a very important contribution to our knowledge of the growth of knowledge. "Its contribution does not consist in the substantive explanation of how the content of knowledge is determined sociologically, but in a negative explanation of why knowledge is rare and intermittent and why it needs very special conditions in which it can grow" (pp. 73-74). Its great contribution lies in emphasizing the social bonding functions of false knowledge.

Some Tests are More Rigorous Than Others

Some tests provide a more rigorous test than others and so offer more information about what may be true or false. Experimental tests are more severe tests of claims compared to anecdotal reports. Unlike anecdotal reports, they are carefully designed to rule out alternative hypotheses about what may be true and so provide more opportunities to discover that a theory is not correct. Calling a study qualitative does not magically remove potential sources of bias that may gravely limit the accuracy of claims. Interviewers and observers are subject to a variety of biases that may distort what is seen or change what occurs. Phillips (1990) argues that qualitative researchers underestimate the potential for bias and error in their work, especially when making causal assumptions. Making accurate predictions (e.g., about what service methods will help a client) is more difficult than offering after the fact (ad hoc) accounts that may sound plausible (even profound), but provide no service guidelines. Dawes (1995) argues that the accuracy of predictions about behavior based on a new method should be better than what is possible by the use of benchmark indicators (e.g., past behavior as a predictor of future behavior). The question raised will suggest the research method required to

explore it. Every research method is limited in the kinds of questions it can successfully address. Purpose will suggest the kinds of evidence needed to test different claims. If our purpose is to communicate the emotional complexity of an experience such as the death of an infant, then qualitative methods may be needed (for example, detailed case examples, thematic analyses of journal entries, or open-ended interviews at different times [Gambrill, 1995]).

A Search for Patterns and Regularities

It is assumed that the universe has some degree of order and consistency. This does not mean that unexplained phenomenon or chance variations are not considered. For example, chance variations contribute to evolutionary changes (Lewontin, 1994). Uncertainty is assumed. Since a future test may reveal a belief to be incorrect, even one that is strongly corroborated (has survived many critical tests), no assertion can ever be proven (Popper, 1972). This does not mean that all beliefs are equally sound; some have survived more rigorous tests than others (Asimov, 1989).

Parsimony

An explanation is parsimonious if most components are required for explaining most related phenomenon. Unnecessarily complex explanations may get in the way of detecting relationships between behaviors and related events.

Scientists Strive for Objectivity

Basic to objectivity is the critical discussion of theories (error elimination through criticism). The theory-laden nature of observation is assumed. "What we call scientific objectivity is nothing else than the fact that no scientific theory is accepted as a dogma, and that all theories are tentative and are open all the time to severe criticism--to a rational critical discussion aiming at the elimination of errors" (Popper, 1994, p. 160). Scientists are often wrong and find out that they are wrong by testing their predictions. Better theories (those that can account for more findings) replace earlier ones. Although the purpose of science is to seek true answers to problems (statements that correspond to the facts) this does not mean that there is certain knowledge. Rather, we may say that certain beliefs (theories) have (so far) survived critical tests or have not yet been exposed to them. And some have been found to be false (see for example Enkin, et. al., 1995). An error "consists essentially in our regarding as true a theory that is not true" (Popper, 1992, p. 4). We can avoid error or discover it by doing "everything possible to discover and eliminate falsehoods" (p. 4). For example, we can actively search for mistakes to increase the likelihood of preventing them in the future and so improve the quality of service provided to clients (McIntyre & Popper, 1983).

A Skeptical Attitude

Scientists are skeptics. They question what others view as fact or "common sense."

Science...is a way of thinking... [It] invites us to let the facts in, even when they don't conform to our preconceptions. It counsels us to consider hypotheses in our heads and see which ones best match the facts. It urges on us a fine balance between no-holds-barred openness to new ideas, however heretical, and the most rigorous skeptical scrutiny of everything--new ideas and established wisdom (Sagan, 1990, p. 265).

Scientists and skeptics seek criticism of their views and change their beliefs (when they have good reason to do so). Skeptics are more interested in arriving at accurate answers than in not ruffling the feathers of supervisors or administrators.

Other Characteristics

Scientific knowledge is publicly reviewed by a community. Science is collective. Scientists communicate with one another and the results of one study inform the efforts of other scientists. Carl Sagan (1995) emphasizes the importance of an "aptitude for wonder." Without this you may have little interest in staying with a problem and trying to learn more about it because you find it fascinating. You have to be among "the whole corp of thought-divers, that have been diving & coming up again with blood-shot eyes since the world began" (Melville, 1849). Some academics I have met give a wan, knowing smile and say, "Yes, I know" when confronted with new discoveries or theories. I have always found this amazing. It reflects a lack of wonder, curiosity and interest in solving problems and an overestimation of knowledge that is on quite a grand scale. Persistence and a capacity for hard work are also needed. Barzun (1950) suggests that despite unfavorable environments, some people manage to continue to nourish a passionate search for knowledge. In this same essay he emphasizes the enormous contributions to be gained from the thoughtful minds that have gone before. "For the educated person has appropriated so much of other men's minds that he can live on his store like the camel on his reservoir" (p. 216). We can travel mentally as well as physically and, like physical travel, we can choose poorly or wisely in relation to the rewards we reap.

Pseudoscience

The term "pseudoscience" refers to material that makes science-like claims but provides no evidence for them (Bunge, 1985; Gray, 1991; Tavris, 1994). Hallmarks of pseudoscience include the following:

- o critical examination of claims/arguments is discouraged
- o the trappings of science are used without the substance
- o reliance on anecdotal evidence
- o not self-correcting
- o unskeptical
- o equates an open mind with an uncritical one
- o falsifying data are ignored or explained away
- o relies on vague language
- o not empirical
- o produces beliefs and faith but not knowledge

- o often not testable
- o does not require repeatability

Proselytizers of many sorts cast their advice as based on science. They use the ideology and "trappings" of science to pull the wool over our eyes in suggesting critical tests of claims that do not exist. Advertisers, both past and present, use the trappings of science (without the substance) to encourage consumers to buy products. Relying on pseudoscientific methods to inflate and promote claims is a common propaganda method in the professions. Classification of clients into psychiatric categories lends an aura of scientific credibility to this practice, whether or not there is any evidence that such a practice is warranted or that it is helpful to clients (Boyle, 1990; Kirk & Kutchins, 1992; Szasz, 1987; 1994). Pseudoscience is characterized by a causal approach to evidence (weak evidence is accepted as readily as strong evidence). A critical attitude, which Karl Popper defines as a willingness and commitment to open up favored views to severe scrutiny, is basic to science, distinguishing it from pseudoscience. By contrast, pseudoscience may offer irrefutable hypotheses and be reluctant to revise beliefs even when confronted with relevant criticism. It makes excessive (unsupported) claims of contributions to knowledge.

Pseudoscience is a billion dollar industry. Products include self-help books, "subliminal" tapes, and call-in psychic advice from "authentic psychics," which have no evidence that they accomplish what they promise (Druckman & Bjork, 1991). Pseudoscience can be found in all fields including multiculturalism (see for example, Ortiz De Montellano, 1992). The terms "science" and "scientific" are often used as adjectives to enhance the credibility of a view or approach even though no evidence is provided to support the view. The term "science" has been applied to many activities in social work that in reality have nothing to do with science. Examples include "scientific charity" and scientific philanthropy.

Quackery

Quackery refers to the promotion and marketing either by professionals or others for a profit of untested, often worthless, and sometimes dangerous health products and procedures (Jarvis, 1990; Pepper, 1984; Young, 1992). For every claim based on sound evidence, we encounter scores of bogus claims in advertisements, newscasts, films, TV, newspapers, and professional sources making it a considerable challenge to resist their lures. Indicators of quackery include the promise of quick cures, use of anecdotes and testimonials to support claims, privileged power (only the great Dr. _____ knows how to _____) and secrecy (claims are not open to objective scrutiny). William Jarvis (1990) suggests that some professionals become quacks for the profit motive (making money) and the prophet motive (enjoying adulation and discipleship resulting from a pretense of superiority).

Propaganda

Quackery and pseudoscience make use of propaganda strategies. Jacques Ellul (1965) suggests that propaganda "is principally interested in shaping action and behavior with little thought" (p. 278). A major function of propaganda is to squelch and censor dissenting points

of view. Common propaganda methods include emotional reasoning, appeals to self interest, censorship and questionable criteria discussed earlier (ad hominem attacks). The inflation of knowledge claims (puffery) is a key propaganda strategy (Rank, 1984). Those who market ideas attempt to forward a view, not through a balanced and accurate presentation of related evidence and alternative views, but through reliance on strategies such as vague, emotional, distorted presentations of disliked positions (see for example Todd, 1992), presentation only of data that support a favored position, and question begging. The resultant harms of propaganda in professional schools are varied and ripple out to others for decades.

Fraud

This term refers to the intentional misrepresentation of the effect of certain actions (e.g., taking a medicine to alleviate depression) to convince us to part with something of value (e.g., our money). It involves deception and misrepresentation (Miller & Hersen, 1992). Fraud is so extensive in some areas that consumers have formed national advocacy groups to warn about bogus claims. Fraudulent claims (often appealing to the trappings of science) are not without their effects; we may not discover effective methods, or we may be harmed by remedies that are supposed to help.

Implications of Valuing Criticism as a Route to Knowledge

If the route to knowledge is via criticism, what are the implications? Both students and those who teach them must value truth over certainty, ignorance and prejudice, and clarity over obscurity. They must value getting closer to the truth more than winning arguments and maintaining social ranking. Karl Popper (1994) argues that relying on unexamined claims about what is true reflects an arrogance that is at odds with a compassion for others. Valuing "truth, the search for truth, the approximation to truth through the critical elimination of error, and clarity" (Popper, p. 70) is needed to overcome the influence of other values (e.g., appearing profound through use of unintelligible language). Valuing truth over prejudice and ignorance requires critical testing of claims and conclusions. Only through criticism can we discover our errors. This is essential for learning how to do better in the future. A candid recognition of and active search for mistakes would keep the inevitable uncertainty involved in our work clearly in view and encourage us to keep track of our mistakes as a way to improve services (McIntyre & Popper, 1983). We must abandon a justification approach to knowledge in which we search for support for our theories and instead use a falsification approach in which we vigorously try to falsify our theories and actively search for avoidable mistakes (Popper, 1972). Indicators of valuing truth over prejudice and certainty include a deep interest in accurately understanding and presenting views, disliked as well as liked.

Valuing truth highlights the vast extent of our ignorance about the world. As Popper (1992) notes, we all are equal in our vast ignorance. "It is important never to forget our ignorance. We should therefore never pretend to know anything, and we should never use big words. What I call the cardinal sin ... is simply talking hot air, professing a wisdom we do not possess." (p.86). We have "the obligation never to pose as a prophet" (p. 206). Valuing truth calls for making well-reasoned decisions--you can make a sound argument for them. For

example, claims have survived risky predictions and are compatible with and informed by empirical data describing relationships between behavior and specific environmental changes. Critical discussion with oneself as well as with others is necessary for making well-informed decisions and valuing truth over certainty, ignorance, and prejudice. We should cultivate the intellectual attitudes of empathy, courage, curiosity, open-mindedness, and reliance on standards such as clarity (Paul, 1993). Principles that Karl Popper highlights as the basis of every rational discussion are as follows:

1. The principle of fallibility: perhaps I am wrong and perhaps you are right. But we could easily both be wrong.
2. The principle of rational discussion: we want to try, as impersonally as possible, to weigh up our reasons for and against a theory: a theory that is definite and criticizable.
3. The principle of approximation to the truth: we can nearly always come closer to the truth in a discussion which avoids personal attacks. It can help us to achieve a better understanding; even in those cases where we do not reach an agreement (Popper, 1992, p. 199).

Valuing truth over ignorance and prejudice requires basing decisions on data as well as theory when necessary to solve problems. Guesses about the causes of problems should be checked against data gathered in real life. For example, only by collecting detailed observational data in real-life, problem-related settings may informed guesses be made about the causes of problem-related behaviors and circumstances (see for example Carr, et al., 1994). Collecting systematic data concerning service outcomes provides a guide for decisions and allows us to discover whether we are helping, harming, or having no effect. It allows clients to find out whether the quality of their lives has improved, remained the same, or diminished. Anthony Flew (1985) contends that the sincerity of our interest in helping clients is reflected in the efforts we make to find out whether we do help them. Compassion for the trouble of others requires finding out if we did help.

Differences between teaching and learning as opposed to indoctrination highlight the emphasis on criticism in the former and authority in the latter (Gambrill, 1997a and b). Teaching and learning require critically reviewing alternative views on subjects discussed, and accurately describing opposing points of view in their strongest form. Knowledge is viewed as tentative, ambiguous, and hard to get. Students as well as instructors are critically reflective (not just reflective) and reasonable. Discordant points of view have a quite different fate in teaching and learning compared with indoctrination. They are welcomed in the former and punished or censored in the latter. Ethical rules suggested by Clark Kerr (1989) as inherent in the creation and distribution of knowledge include the careful collection and use of evidence, including the search for "inconvenient facts," as in the process of attempted "falsification"; the honest and careful use of the ideas and the work of others; the obligation to be skeptical; an openness to alternative explanations; separating personal evaluation based on moral values from the presentation of evidence and analysis; and, as a corollary, making explicit any personal evaluations.

We should hire instructors who value criticism over authoritarianism as a route to knowledge. (A form for exploring the degree to which instructors encourage critical thinking can be found in Critical thinking for social workers: A workbook, Gibbs & Gambrill, 1996.) Students should be accurately informed about what science is and what it is not and how it differs from pseudoscience and quackery and from authoritarianism in considering knowledge claims. They should understand the limitations and negative consequences (e.g., inflated claims of knowledge) of a justification (inductive) approach to knowledge. Valuing truth over prejudice and certainty requires us to blow the whistle on puffery and on power plays disguised as concerned criticism. Examples include claims based on criteria that do not allow us to falsify guesses about what may be true or false. One of the important contributions of academics is the preparation of up-to-date critical reviews of the evidence related to alternative views concerning a topic. These are of value not only to other scholars and researchers, but to professionals and policy makers as well. One indicator of quality is inclusion of critical information about each study reviewed (e.g., sample sizes, reliability and validity of measures used). The Cochrane Collaboration headquartered in Oxford, England is an important resource. The purpose of this collaboration is to identify and to review all controlled experimental trials related to a particular claim and to prepare definitive reviews (see, for example, Enkin, Keirse, Renfrew, & Neilson, 1995). A bill of rights for the readers of professional and academic journals should be drawn up. This would include the right to clear (rather than obscure) writing and rigorous critical appraisal of the evidence related to competing points of view concerning topics discussed. Students should be conversant with limitations of different kinds knowledge claims and data collection methods and learn about the political, economic, and social influences on the professions (Abbott, 1988; Friedson, 1986; Goode, 1960; Margolin, 1997; Szasz, 1994).

Obstacles

Criticism may bring wrath from those criticized (see, for example, Kolata, 1997). Some argue that the universities within which professional schools are based have abandoned their goals of teaching and learning for one of certification (Barzun, 1968; 1993). Some argue that universities are the least likely places for knowledge to grow (Bartley, 1990) and the most likely to adopt relativism (Gellner, 1992; Patai & Kortege, 1994). Students who present sound arguments against popular views may be confronted by power plays from professors who make pronouncements (claims with no arguments) that the student has seriously misread the literature when in fact it is the professor who has seriously misread the literature. Neither professionals nor researchers with reputations and funding to protect may be eager (let alone willing) to blow the whistle on dubious classifications (e.g., attention deficit disorder) and intervention programs (see for example, Dawes, 1994; McGuinness, 1989).

Superstition and pseudoscience abound in our everyday lives (see for example Burnham, 1987; Gardner, 1991; Gray, 1991). Critical thinking, writing, and reading take time and protection from outside interruptions such as unpredictable noises as eloquently described by Virginia Woolf in A room of one's own (1929). Writing takes time, and requires asking, "Is this word necessary? Is this word clear? Is this the best word?" Where is this peaceful time to come from? The first decision we have to make is whether we want to read, write, and think,

critically. If the answer is yes, we must plan how to do so (e.g., scale down the number of projects we work on). We can make maximal use of precious high-quality reading time by choosing the very best minds to sample. The scholar's job is to hover over the enormous quantity of written material searching for the very best, the gems.

Summary

Thinking about knowledge and how to get it is a subject of vital interest. We can draw on the hard work and clear writing of philosophers such as Gellner, Munz, and Popper to critically appraise different perspectives (e.g., relativism and reason) and to maximize the likelihood of contributing to the growth of knowledge that helps clients minimize problems they confront. We are more likely to contribute to the growth of knowledge if we do not seek utopian goals, but, as Sir Karl Popper suggests, try to minimize avoidable miseries. A focus on minimizing avoidable miseries should help us to have the courage and integrity to challenge puffery, avoid propagandistic appeals, and value truth over winning arguments. It will provide the pleasures of pursuing answers to questions that make a difference in the lives of others.

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